

WHAT IS CLAIMED IS:

1. An engine for a vehicle comprising:

an engine body having a cylinder block, a lower case, a cylinder head and a cylinder head cover;

a plurality of pistons slidably fit within cylinders and being connected to a crankshaft via connecting rods;

a rotor of a generator being connected to a first end of the crankshaft rotatably supported by a crankcase forming part of the engine body;

a starting motor having a rotational axis, said starting motor being mounted at an approximately central portion of said engine body along a rotational axis of said crankshaft;

an over-running clutch for inputting a rotational power from the starting motor, said rotational axis of said starting motor being parallel to the rotational axis of said crankshaft, wherein said over-running clutch is mounted to said engine body through a second end of said crankshaft; and

a starting clutch being interposed between said crankshaft and a main shaft having a rotational axis parallel to the rotational axis of said crankshaft, said starting clutch being mounted to a first end of said main shaft, wherein said starting motor is disposed within an angular range defined by a cylinder axis (C) of said cylinders of said engine body and a straight line connecting the rotational axis of said crankshaft to the rotational axis of said main shaft, and along a plane perpendicular to the rotational axis of said crankshaft.

2. The engine according to claim 1, wherein said over-running clutch is mounted to the second end of said crankshaft at a position where said starting clutch is sandwiched between said over-running clutch and said starting motor in a direction along the rotational axis of said crankshaft.

3. The engine according to claim 2, further comprising a starting gear reducer including gears respectively fixed on both ends of a rotational shaft overlapping said starting clutch and rotatably supported by said engine body, wherein said starting gear reducer is provided between said starting motor and said over-running clutch.

4. The engine according to claim 1, wherein said starting motor is disposed behind said starting clutch on said crankshaft in such a manner that a part of said starting motor overlaps said starting clutch with respect to an axial direction of said crankshaft.

5. The engine according to claim 3, wherein said starting motor is disposed behind said starting clutch on said crankshaft in such a manner that a part of said starting motor overlaps said starting clutch with respect to an axial direction of said crankshaft.

6. The engine according to claim 1, wherein said over-running clutch further includes a clutch outer, a clutch inner and a plurality of sprags interposed between said clutch outer and the clutch inner.

7. The engine according to claim 6, wherein said clutch outer has cylindrical hubs fixed to the second end of the crankshaft.

8. The engine according to claim 5, wherein said over-running clutch further includes a clutch outer, a clutch inner and a plurality of sprags interposed between said clutch outer and the clutch inner.

9. The engine according to claim 8, wherein said clutch outer has cylindrical hubs fixed to the second end of the crankshaft.

10. The engine according to claim 9, wherein said starting clutch includes a clutch housing, a clutch center, a plurality of friction plates and a pressing plate.

11. The engine according to claim 2, wherein said starting motor is disposed at an approximately central portion of said engine body.

12. The engine according to claim 10, wherein said starting motor is disposed at an approximately central portion of said engine body.

13. The engine according to claim 3, wherein said starting gear reducer includes a pinion, a large-diameter gear, a small-diameter gear, an idle gear and a ring gear, wherein said pinion is affixed to an output shaft of said starting motor.

14. The engine according to claim 12, wherein said starting gear reducer includes a pinion, a large-diameter gear, a small-diameter gear, an idle gear and a ring gear, wherein said pinion is affixed to an output shaft of said starting motor.

15. A method of setting a bank angle of an engine on a motorcycle at a relatively high value, wherein said engine includes an engine having an engine body having a cylinder block, a lower case, a cylinder head and a cylinder head cover; a plurality of pistons slidably fit within cylinders and being connected to a crankshaft via connecting rods; a rotor of a generator being connected to a first end of the crankshaft rotatably supported by a crankcase forming part of the engine body; a starting motor having a rotational axis, said starting motor being mounted at an approximately central portion of said engine body along a rotational axis of said crankshaft; an over-running clutch for inputting a rotational power from the starting motor, said rotational axis of said starting motor being parallel to the rotational axis of said crankshaft, wherein said over-running clutch is mounted to said engine body through a second end of said crankshaft; and a starting clutch, said method comprising:

mounting said starting clutch between said crankshaft and a main shaft having a rotational axis parallel to the rotational axis of said crankshaft, and mounting said starting clutch to a first end of said main shaft, and

mounting said starting motor in a position disposed within an angular range defined by a cylinder axis (C) of said cylinders of said engine body and a straight line connecting the rotational axis of said crankshaft to the rotational axis of said main shaft, and along a plane perpendicular to the rotational axis of said crankshaft.

16. The method according to claim 15, further comprising mounting said over-running clutch to the second end of said crankshaft at a position where said starting clutch

is sandwiched between said over-running clutch and said starting motor in a direction along the rotational axis of said crankshaft.